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(54) FOAM ASSISTED WATER CLOSET
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(57) Claim

1. A sanitary device comprising a source of water, a source of a foaming agent, an air inlet, and a foaming tank; the arrangement being such that, in use, a predetermined quantity of water passes from said source of water into said foaming tank, a predetermined quantity of foaming agent to pass into said foaming tank, air is forced into said foaming tank to generate foam or suds and to force the foam or suds from said foaming tank into the bowl or pan of a toilet.

2. A sanitary device as claimed in Claim 1 wherein there is provided a lower tank which receives a foaming solution comprising a mixture of a predetermined quantity of foaming agent and a predetermined quantity of water, there being provided means to enable said mixture of said foaming agent and said water to pass into said foaming tank.

3. A sanitary device as claimed in Claim 1 or Claim 2 wherein there is provided a fan adapted in use to force air into an air pipe and thence into the lower portions

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of said foaming tank, said air, in use, passing through
a grid so as to generate foam in said foaming tank.

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Form 10

COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE

Short Title:

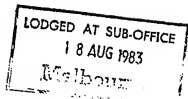
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Complete Specification for the invention entitled: "FOAM ASSISTED WATER CLOSET"

The following statement is a full description of this invention, including the best method of performing it known to me:—

* Note: The description is to be typed in double spacing, pica type face, in an area not exceeding 250 mm in depth and 100 mm in width, on tough white paper of good quality and it is to be inserted inside this form.

This invention relates to improvements in sanitary devices and refers particularly, though not exclusively, to a device for injecting foam into a toilet bowl or pan.

Modern sanitary facilities have been developed over
5 a significant period of time. However, since the development of the first water closet there have been many problems associated with the use which are still with us today:

1. The emanation of foul or offensive odours;
- 10 2. The problem of a user being splashed by the water contained within the pan;
3. The need for a deodorizing agent; and
4. The need for a disinfectant.

There have been some attempts to overcome these problems of late and one example of this is the alleged
15 invention disclosed in the specification of U.S. Patent 3,585,649 granted June 22nd 1971 to Masami Miya. However, this particular system provides for a constant flow of foam into the toilet bowl and does not provide for the normal flushing action. This particular proposal would
20 be extremely expensive to operate, inefficient in use and totally impractical. Furthermore, it would not meet the approval of the necessary health and sanitary authorities.

It is therefore the principal object of the present invention to provide a device which attempts to overcome
25 the problems as outlined above.

With the above and other objects in mind the present invention provides a sanitary device comprising a source of water, a source of a foaming agent, an air inlet,

and a foaming tank; the arrangement being such that, in use, a predetermined quantity of water passes from said source of water into said foaming tank, a predetermined quantity of a foaming agent is passed into said foaming tank, air is forced into said foaming tank to generate foam or suds and to force the foam or suds from said foaming tank into the bowl or pan of a toilet.

If desired, the water source and the foaming agent source may be combined into a liquid source containing a pre-mixed solution of water and foaming agent.

In order that the invention may be clearly understood and readily put into practical effect there shall now be described by way of non-limitative example only preferred constructions of sanitary devices incorporating the principal features of the present invention, the description being with reference to the accompanying illustrative drawings. In the drawings:

Figure 1 is a schematic view of a first embodiment of a sanitary device incorporating the preferred features of the present invention;

Figure 2 is a schematic view of a second embodiment of a sanitary device incorporating the preferred features of the present invention;

Figure 3 is a schematic view of a third embodiment of a sanitary device incorporating the preferred features of the present invention;

Figure 3(a) is an enlarged cross-sectional schematic view of the electric solenoid pump of the embodiment of Figure 3;

Figure 4 is a schematic side view of a fourth embodiment of a sanitary device incorporating the preferred features of the present invention;

5 Figure 4(a) is an enlarged cross-sectional schematic view of the main valve portion of the embodiment of Figure 4; and

Figure 4(b) is a vertical cross-sectional end schematic view of the embodiment of Figure 4.

10 To refer to Figure 1 there is shown a solution tank 1 which is designed to hold a quantity or volume of solution which comprises a mixture of water and the foaming agent. Preferably the solution tank is such that the level of the solution contained within the tank can be readily determined. This can be done by having the tank
15 itself being transparent or translucent or by any other suitable means.

20 The solution tank 1 contains a volume of solution 13 therein with the amount of solution being able to be determined as in accordance with the above description and the level of the solution and its feed being controlled by gravity. The solution 13 passes through an opening in the lower end of the solution tank 1 and passes through into a lower tank 15 where the level of the solution 2
25 is determined by the location of the solution tank 1 and its height within the lower tank 15.

Also located in the lower tank 15 is a foaming tank 5. The foaming tank 5 has an inlet valve 16 which controls

the inflow of solution into the interior of the foaming tank 5. As can be seen from the illustration, prior to operation of the device, the solution level in the foaming tank 5 is substantially the same as the solution level in the lower tank 15. At its lower end the foaming tank 5 has a grid 4 which co-operates with an air tube 3 as will be understood from the following description. The air tube 3 passes through the lower tank 15 and is connected to a chamber in which is located a motor 12 which drives a fan 11. Upon activation of the motor by means of a starting switch 8 which is connected to a power supply 10 air is forced down the tube 3 and through the grid 4. Upon activation the valve 16 also closes. This forces air through the grid 4 to cause the solution 17 contained within the foaming tank 5 to bubble to thus create a large volume of foam. The foam then passes up the foaming tank 5 and along and through an outlet spout 7 and into a toilet pan 6. A timer 9 controls the operation of the motor 12 so that it switches off after a prescribed period of time after the activation of the motor by the switch 8. This time is set so that the optimum amount of foam is generated to provide for the proper amount of foam in the toilet pan 6. This is also controllable by the volume of solution 17 within the foaming tank 5 as at the activation time. Once the timer 9 switches off the motor 12 it also de-activates the inlet valve 16 so that more solution can pass into the foaming tank 5. The solution level will rise to that as shown whereupon the effect of gravity and pressure build up within the solution tank 1 will cause the level of solution in the bottom tank 15 to stabilize.

At this stage the device is ready for further operation as is required.

To refer now to Figure 2 there is shown an alternative embodiment. This embodiment is designed to be more automatic in its operation and requiring less up-keep. It does not require a pre-mixed solution of a foaming agent and water.

Here, the water 43 contained within a system 41 passes along a water supply pipe 35 which passes through the wall of the cistern 41 adjacent the normal top level 42 of the water 43. The water supply pipe 35 passes through the wall of the water tank 22 so as to provide for a water level and volume 30 within the water tank 22. The height of the water level in the water tank 22 is controlled by the water outlet therefrom and air lock 24. As can be seen, the water level in the tank 22 will not rise above a certain level within the tank 22 which level is the same as the water level 42 in the cistern 41. Also located in the water tank 22 is a splash guard and air filter 23 which filters the air supplied into the tank by the fan 40 as driven by the electric motor 21. The motor 21 is supplied by an electric supply 34 and its time of operation is controlled by an electronic timer 33.

There is also provided a tank 31 for holding a concentrated foaming agent 39. This foaming agent 39 is passed into the water tank 22 by virtue of a pump-action handle 38 which passes the solution 39 into the tank 22

below the filter 23 via a pipe 37.

5 Adjacent the toilet pan 36 there is provided a
foaming tank 28. The mixture of the water and concentrated
foaming agent is fed into the foaming tank 28 via a supply
pipe 25 which leads to an inlet 26. Immediately above the
inlet 26 is a grid 27. At its upper end the tank 28
has a spouted outlet 29 so as to pass the eventuating
foam into the toilet pan 36.

10 The operation of this embodiment is that upon
everything being installed water will pass along the pipe
35 and into the interior of tank 22 until it rises to the
level as shown in the drawings. Immediately upon foam
being required in the toilet pan 36 a user would press down-
wardly on button 38 to cause a volume of concentrate 39 of
15 predetermined quantity to pass along pipe 37 and mix with
the water contained within the tank 22. In pushing down
the handle 38 the user would cause a micro-switch 32 to switc
ON the electric motor 21 which would drive the fan 40 to
force air down through the filter 23. This would force
20 the water and foaming concentrate down the tank 22, through
the outlet 24 and into pipe 25. The water would travel
downwardly under the effect of the fan and gravity and
through the inlet pipe 26 and thence into the foaming tank
28.

25 When the initial contact was made with the micro-
switch 32 a solenoid valve 44 would close off the water pipe
35 by the increase in pressure within the tank 22 so that
the fan pressure could force all of the water

down into the foaming tank 28. The fan would then continue to operate to cause air to pass through the mixture of the foaming agent and the water to cause a large volume of foam to be generated. The air would
5 continue to force this foam upwardly through the tank 28, through the spout 29 and thence into the toilet pan 36.

The timer 33 would operate to switch off the motor 21 and thus the fan 40 after a predetermined time and would also act to then open the valve 44 so as to
10 allow the ingress of further water into the tank 22 for subsequent operation.

To refer now to Figures 3 and 3(a) there is shown a third embodiment wherein power is supplied by means of a power source 51 which is operatively connected to an
15 electronic timer 52. A start button 53 is provided so as to activate the device. The electrical power is supplied to a motor driven fan 54 which is adapted to pass air through the air chamber 55 into an air pipe 56. The air passes through pipe 56 into inlet 57 which passes air
20 through a grid 58 and thus into the interior of a foaming tank 59. At the top end of the foaming tank 59 there is provided an outlet spout 60 so as to pass the foam into the toilet pan 61.

A concentrated foaming agent 62 is provided within
25 a foaming tank 64. An opening 63 is provided in the tank 64 so as to allow for the re-filling of the tank 64. The foaming agent is mixed with water which passes from the toilet cistern 69 via a small holding reservoir 67 filled to enable continuous syphoning and which is

with water 68. The water 66 in the cistern passes into the reservoir 67 then into a water pipe 65 by means of a syphon action. The water passes down the pipe and then through an outlet which is controlled by a valve 70 operated by means of the ball 71 of a ball operated valve. The water 72 is mixed with the concentrate 62 after the concentrate passes down to mix with the water via a solenoid operated pump 75. The water and concentrate mixture is contained within a lower tank 74 and passes through into the foaming tank 59 via a pressure sensitive valve 73.

The pump 75 is shown in detail in Figure 3(a) and comprises an approximately "T" shaped plunger 76 the lower end of which is fitted with a piston 82 which is sealingly located in a housing 78. The plunger 76 is effected by the electric solenoid which comprises a starter 77 and a coil 83. It is to be noted that the pump is shown in the "ON" position. The arrangement is that a pipe 81 is connected to the concentrate tank 64 and has a valve 80 at the end thereof. A further valve 80 is provided in the top of the bottom tank 74. Upon the power being applied the coil forces the plunger into the position shown and the increase in pressure of the concentrate contained below the piston 78 forces the lower valve 80 open and the upper valve 80 shut so as to force a predetermined quantity of concentrate through lower valve 80 and thence down into the lower tank 74. Upon the power being turned "OFF" the pressure is reduced and the plunger 76 returns to its

original position under the action of a spring 84.
This draws the piston 78 upwards so as to draw the lower
valve 80 upwards and the upper valve 81 open. This allows
concentrate to enter the interior 79 via the pipe 81.
5 In this way a predetermined quantity of concentrate can be
admitted to the tank 74 every time the fan 54 is switched on.

The arrangement of the parts of Figures 3 and 3(a)
is such that water passes from the cistern 69 down tube
65 by means of a syphon action and enters the lower tank
10 74 via valve 70. When the water is at the desired height
the ball 71 acts to force the valve 70 down to thus close
off the end of the pipe 60. In this way the water
achieves the level shown in the illustration. When the
switch 53 is activated the timing cycle controlled by timer
15 52 is commenced and the fan 54 switched on. Also, the
pump 75 is activated in accordance with the above
description and a quantity of foaming agent enters the
tank 74 and mixes with the water contained therein.
This mixture also passes through into the interior of foaming
20 tank 59. The air is forced down the pipe 56, inlet 57
and through the grid 58 to cause foam to be generated within
the foaming tank 59. The foam then passes through the
outlet spout 60 and into the toilet pan 61. The timing
cycle of the timer 52 is designed such that the requisite
25 amount of foam is generated. This is also controlled by
the volume of water and the amount of foaming agent.

Figures 4, 4(a) and 4(b) show an arrangement whereby the devices of Figures 1 to 3 and 3(a) can be located.

Here, the foam generator is generally designated as 107 and would normally be located adjacent to the toilet pan and beneath the cistern. Preferably, a form of valve 108 is used. This form of valve is located between the cistern and the toilet pan. The normal flushing water pipe 101 would be interrupted to allow the valve 108 to be placed in position. Preferably, the valve 108 is adjacent the toilet pan 104. The valve would be after the lower bend in the pipe 101 and would include seals 102 so as to maintain a proper water-tight seal. The valve includes a valve body 103 in which is contained a pivotable valve member 105 which is secured to the upper portion of the valve body 103. The pivotable valve member 105 is adapted to close off a pipe 106 which is the foam pipe and is equivalent to the spout 60 on Figure 3.

The operation of this valve is that when the foam generator is activated gravity has forced the pivotable valve member 105 to the position shown in Figure 4(a). In this way the foam can pass from the pipe 106 directly into the toilet pan. However, when the cistern is operated the flushing water passes down pipe 101 and forces valve 105 upwardly so as to block off access of foam from the pipe 106 into the toilet pan 104. This enables full flow of the water from the cistern into the pan 104. Once the flushing water has passed through, the pivotable valve member would again drop under the influence of gravity

to the position shown. The purpose of this valve is to prevent the flushing water passing directly into the foam generator and also separates the two paths - the foam from the water.

5 It must be remembered with the foregoing embodiments that many variations and changes may be made without departing from the scope of the invention the scope of which is to be determined from the following claims. For example, the timer referred to in the foregoing
10 descriptions may have adjustable means thereon so that the length of the operation time of the fan could be varied. Also, the amount of concentrate to be added to the water in accordance with the embodiments of Figures 2, 3 and 3(a) may be able to be varied so that the amount of
15 foam generated can be altered. Also, for the embodiment of Figure 2 the height of the water tank relative to the toilet cistern should be able to be varied so that the amount of water involved with the water and concentrate mixture can also be varied.

20 It is to be realised that many variations such as those outlined can be made whilst still remaining within the ambit of the invention as defined in the following claims.

The claims defining the invention are as follows:

1. A sanitary device comprising a source of water, a source of a foaming agent, an air inlet, and a foaming tank; the arrangement being such that, in use, a predetermined quantity of water passes from said source of water into said foaming tank, a predetermined quantity of foaming agent to pass into said foaming tank, air is forced into said foaming tank to generate foam or suds and to force the foam or suds from said foaming tank into the bowl or pan of a toilet.
2. A sanitary device as claimed in Claim 1 wherein there is provided a lower tank which receives a foaming solution comprising a mixture of a predetermined quantity of foaming agent and a predetermined quantity of water, there being provided means to enable said mixture of said foaming agent and said water to pass into said foaming tank.
3. A sanitary device as claimed in Claim 1 or Claim 2 wherein there is provided a fan adapted in use to force air into an air pipe and thence into the lower portions of said foaming tank, said air, in use, passing through a grid so as to generate foam in said foaming tank.
4. A sanitary device as claimed in any one of Claims 1 to 3 wherein said foaming tank has an outlet spout so as to, in use, pass foam into said toilet pan.
5. A sanitary device as claimed in any one of Claims 1 to 4 wherein said source of water and said source of a foaming agent comprise a tank holding a mixture of water and foaming agent, said tank being located in said lower tank in such a way as to allow a predetermined quantity of

said mixture to pass into said lower tank for each operation.

6. A sanitary device as claimed in any one of Claims 1 to 4 wherein said source of water is the toilet cistern.

7. A sanitary device as claimed in Claim 6 wherein said lower tank is located adjacent said toilet cistern and is adapted to receive water from said cistern and foaming agent from an adjacent concentrate tank.

8. A sanitary device as claimed in Claim 7 wherein said concentrate tank has a pump adapted to provide a predetermined quantity of foaming agent into said lower tank for each operation of said sanitary device.

9. A sanitary device as claimed in Claim 8 wherein said lower tank has an outlet therefrom which comprises said air pipe which is adapted to, in use, pass said mixture of said water and said foaming agent from said lower tank into said foaming tank and thence the air into said foaming tank.

10. A sanitary device as claimed in any one of Claims 7, 8 or 9 wherein said lower tank is provided with an air filter and splash guard.

11. A sanitary device as claimed in any one of the preceding claims wherein said lower tank is provided with a ball valve so as to control the volume of water passing into said lower tank and there is also provided a solenoid operated pump to pass said foaming agent into

said lower tank for each operation of said sanitary device.

12. A sanitary device as claimed in any one of the preceding claims wherein there is provided a pivotable valve located within a valve housing adjacent said toilet pan so as to control the ingress of said foam or suds into said toilet pan when said sanitary device is in use.

13. A sanitary device substantially as hereinbefore described with reference to Figure 1; Figure 2; Figures 3 and 3(a); and Figures 4, 4(a) and 4(b) of the accompanying drawings.

D A T E D this 18th day of August, 1983.

JOSEPH PARACKI

By his Patent Attorneys:

CALLINAN AND ASSOCIATES

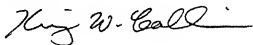
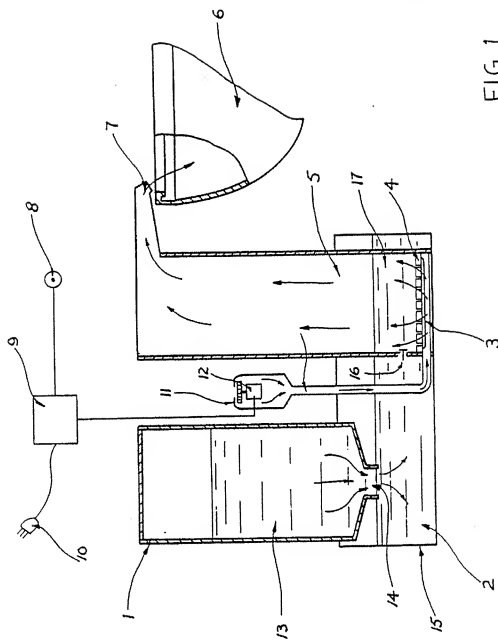


FIG. 1.



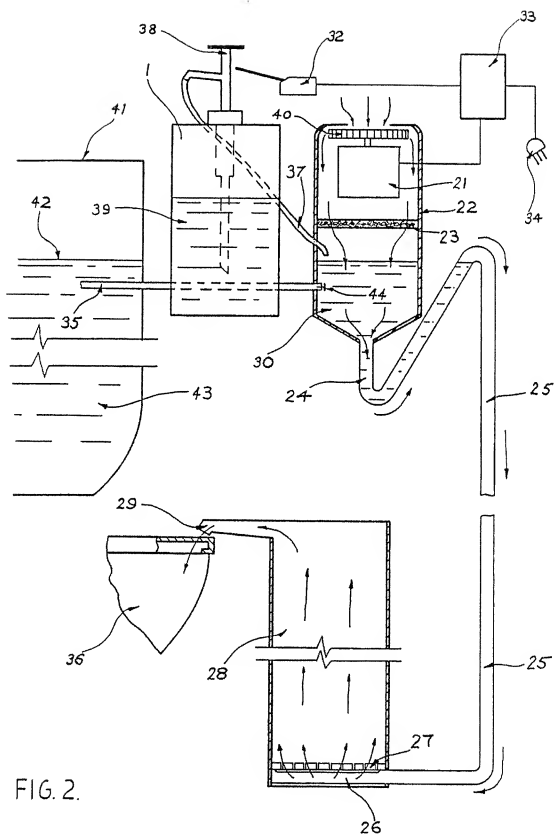


FIG. 2.

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FIG. 3(a).

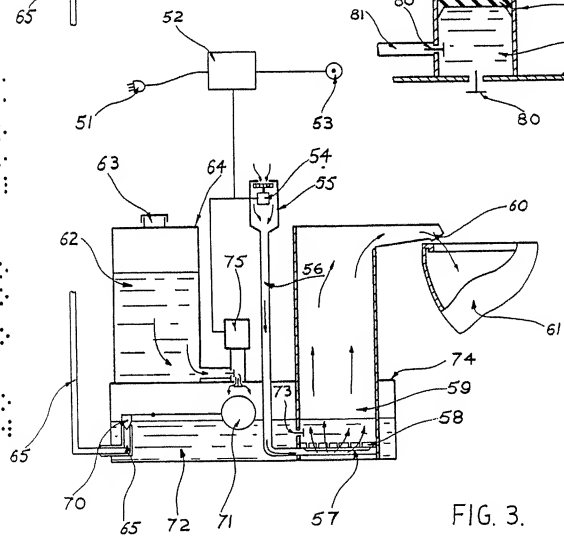
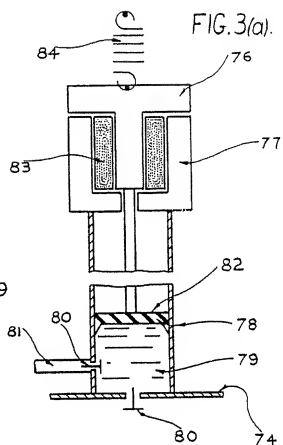
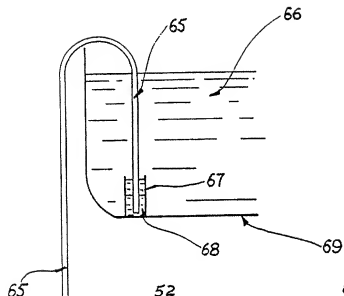


FIG. 3.

